GPG FINDINGS **012**

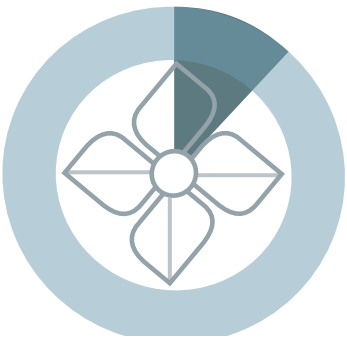
MARCH 2014

SYNCHRONOUS & COGGED FAN BELTS

OPPORTUNITY

How much energy is used for ventilation in U.S. office buildings?

12%
OF ELECTRICITY
GOES TO FAN VENTILATION[1]



ADDITIONAL SAVINGS POSSIBLE

Belt-driven fans are also used in non-ventilation applications

TECHNOLOGY

How do synchronous and cogged fan belts save energy?

REDUCE FRICTION AND BENDING RESISTANCE

BY NOTCHING THE INNER SIDE OF THE BELT

SYNCHRONOUS BELTS ALSO **REDUCE SLIPPAGE** BY INTEGRATING TEETH WITH SLOTS ON THE MOTOR PULLEY

2-5%
MORE EFFICIENT
THAN STANDARD V-BELTS

M&V

Where did Measurement and Verification occur?

NATIONAL RENEWABLE ENERGY LABORATORY measured the performance of cogged V-belts and synchronous drive belts provided by the Gates Corporation at the Byron G. Rodgers Federal Building and U.S. Courthouse in Denver, Colorado

RESULTS

How did synchronous and cogged fan belts perform in M&V?

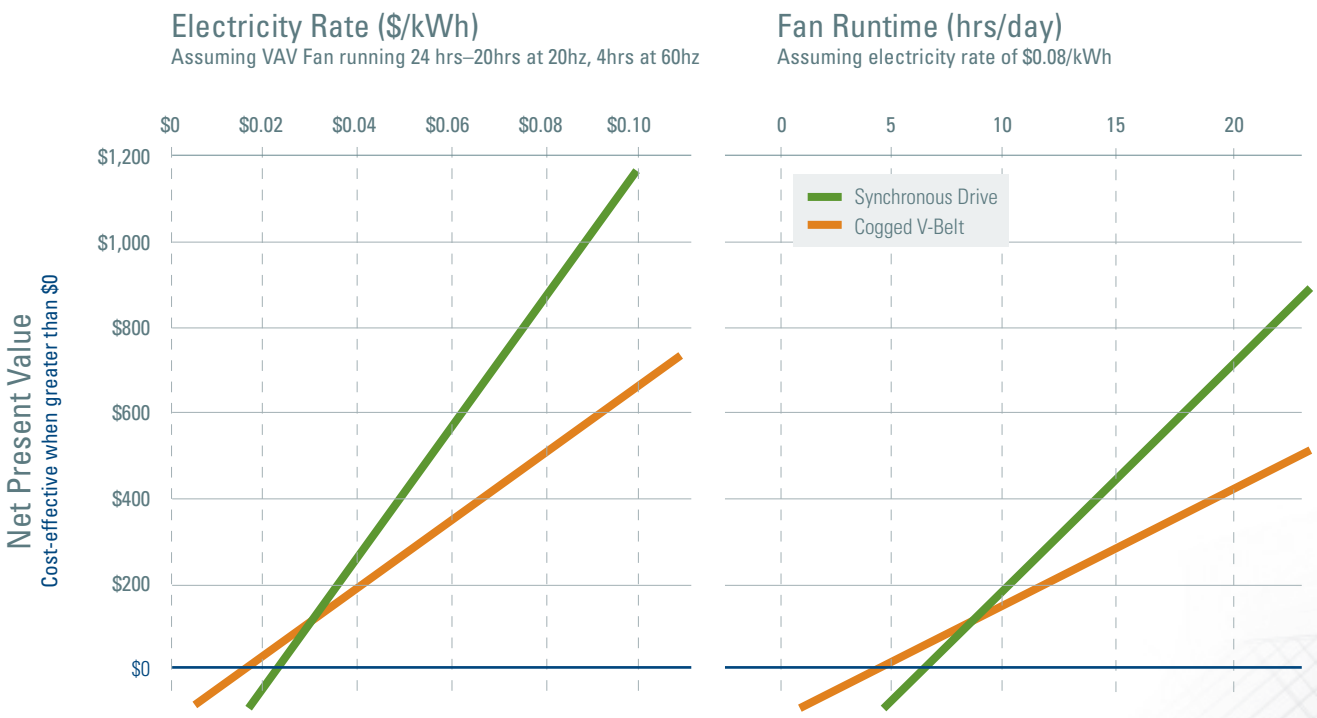
2-20%
ENERGY SAVINGS
FOR SYNCHRONOUS ON VAV
2% AT 60 HZ, 20% AT 15 HZ
Cogged fan belts on CV fans offered half the savings[2]

75%
LOWER O&M
FOR SYNCHRONOUS
Cogged O&M equivalent to standard V-belts[3]

<4
YEARS
PAYBACK FOR SYNCHRONOUS[4]
Repeat installations have immediate payack; Cogged payback < 1 year [5]

Net Present Value as a Function of Electricity Rates & Fan Runtime

Synchronous cost-effective at $0.024/kWh or 6.8 hrs/day; Cogged cost-effective at $0.15/kWh or 4.3 hrs/day



DEPLOYMENT

Where does M&V recommend using synchronous and cogged fan belts?

REPLACE V-BELTS WITH SYNCHRONOUS DRIVE BELTS ON ALL VAV FANS

Belts on fans with high operating hours should be replaced first

ON CV FANS, REPLACE V-BELTS AT END-OF-LIFE WITH COGGED V-BELTS

[1]Synchronous and Cogged Fan Belt Assessment. Dylan Cutler, Jesse Dean, Jason Acosta (NREL), March 2014, p.1 [2]Ibid, p.2 [3]Ibid, p.3 [4]Ibid, p.5 [5]Ibid, p.4

GSA

The GPG program enables GSA to make sound investment decisions in next generation building technologies based on their real world performance. **www.gsa.gov/gpg**